1.1 Scalars and Vectors

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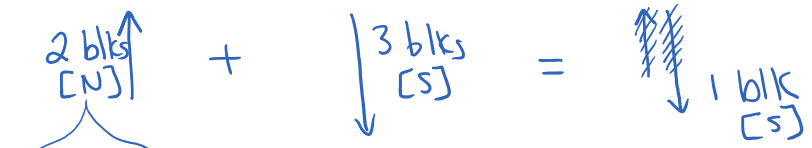
Scalars – have no direction, only have magnitude.
– volume, mass, length/distance, speed, energy

Vectors – have direction **and** magnitude
– displacement, velocity, acceleration, force, momentum
– symbol is "bolded" or has an arrow on top "$\vec{F}$"

once around
distance = 1 km
displacement = 0 km
= change in position

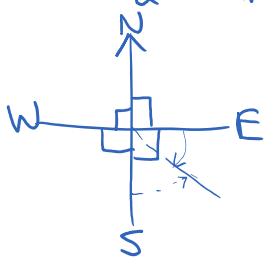
Vector addition:

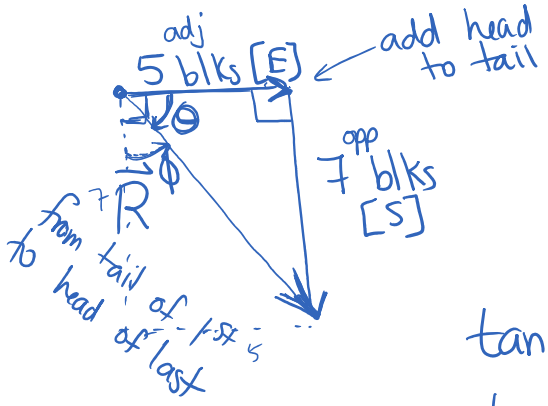
1-dimensional:



or $-2\text{ blks}[S] + 3\text{ blks}[S] = 1\text{ blk}[S]$

2-dimensions:





pythagoras
$R^2 = 5^2 + 7^2$
$R = \sqrt{25+49}$
$= 8.6$ blks
magnitude

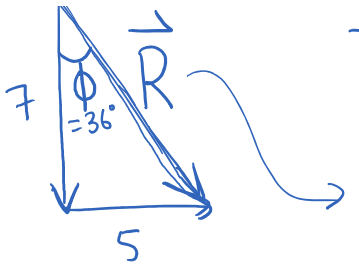
$\tan\theta = \frac{\text{opp}}{\text{adj}}$

$\tan\theta = \frac{7}{5}$

$\theta = \tan^{-1}\left(\frac{7}{5}\right)$

$\theta = 54^\circ$

$\vec{R} = 8.6\text{ blks}[54^\circ \text{ S of E}]$



$\vec{R}$ = 8.6 blks [54° S of E]
or
= 8.6 blks [36° E of S]

$\theta = \tan^{-1}\left(\frac{7}{5}\right)$
$= 54°$
angle

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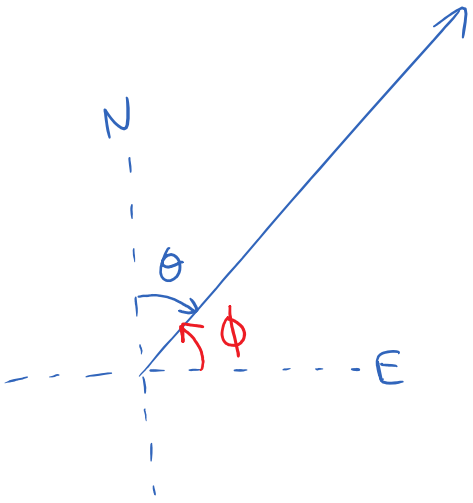
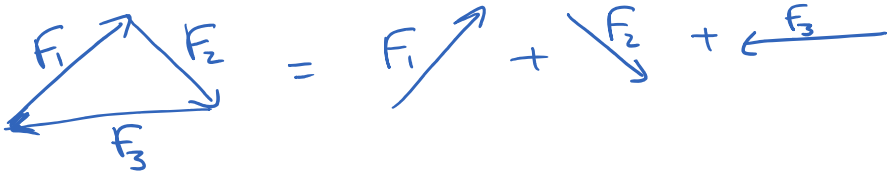
Ans 2. no diff
3. 260m [23° E of N] = 260m [67° N of E]
4a) 5 steps [53° S of E] = 5 steps [37° E of S]
b) 17 steps



$\theta°$ E of N
$\phi°$ N of E

Equilibrium - two or more forces acting on a body, yet the resultant is zero; all forces balance out.

- if in equilibrium, all vectors connect head to tail with no resultant



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Subtracting Vectors

- add the opposite

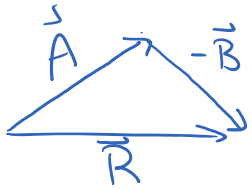
$$\Delta V = V_f - V_i$$
$$= V_f + (-V_i)$$

↖ opposite direction

ex

$\vec{A} - \vec{B}$

$\vec{A} + (-\vec{B}) =$



1.1.1 Investigation

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